

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
7 September 2001 (07.09.2001)

PCT

(10) International Publication Number  
**WO 01/64041 A1**

- (51) International Patent Classification<sup>7</sup>: **A23B 7/154**, 9/26, A23L 3/3544, A01N 3/02
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- (21) International Application Number: **PCT/AU00/01041**
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date:  
4 September 2000 (04.09.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (30) Priority Data:  
PQ 5983 3 March 2000 (03.03.2000) AU
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- Published:**  
— with international search report
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **FRUIT AND VEGETABLE PRESERVATIVE**

(57) **Abstract:** A preservative solution for peeled fruits and vegetables, nuts, shoots, fruit and vegetable juices and cut flowers (as hereinbefore defined) including a fruit juice component including vitamin C or ascorbate which is palatable and which inhibits oxidation of the fruit or vegetable to be preserved, a preservative component, such as sugar, and an antioxidant component which includes at least one antioxidant containing flavonoids, such as one selected from a natural oil coating material, such as grapeseed oil, and/or an extract from the bark of *Pinus Radiata* or *pinus pinaster*, such as Enzogenol or other proanthocyanidin powder or any one of the flavonoid containing antioxidants described herein.

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## FRUIT AND VEGETABLE PRESERVATIVE

### Field of the Invention

This invention relates to the preservative solutions which enable peeled fruit and prepared vegetables, peeled or chopped as for cooking or raw consumption, nuts, shoots, fruit and vegetable juices, and cut flowers to be marketed and stored without unacceptable deterioration.

### Background of the Invention

Citrus fruits, such as oranges, mandarins and grapefruit, deteriorate rapidly once peeled due to oxidation of the fruit and other effects. Such rapid spoiling has prevented the marketing of peeled citrus fruits, and in view of the known difficulties associated with the peeling of such fruits, has restricted the consumption and sale of such fruits. Other fruits, such as apples, are equally susceptible to spoiling when peeled or exposed to the atmosphere in the raw state. Vegetables, nuts and shoots are similarly susceptible to spoiling, as are fruit and vegetable juices and cut flowers.

Nature has demonstrated that vitamin C is never found alone in nature: it is always found in combination with flavonoids. Flavonoids were first located in the white pith of oranges. The inclusion of vitamin C and/or ascorbates (calcium, magnesium, sodium or potassium ascorbates) in nature in combination with flavonoids results in natural preservation of the fruit or vegetable.

### Summary of Invention and Object

It is an object of the present invention to provide for the preservation of peeled fruits and vegetables, peeled or chopped as for cooking or raw consumption, peeled and cut fruits, fruit salad, nuts and shoots, fruit and vegetable juices and cut flowers, including oranges, mandarins, grapefruit, apples, kiwi fruit, guavas, lychees, rumbutans, apricots, peaches, nectarines, pineapple, melon, strawberries, cherries, passionfruit, mangostein, mango, asparagus, broccoli, avocado, cauliflower, beans (whole or chopped), peas (including shelled peas and snowpeas), celery, carrot (chopped, shredded or in straws), capsicum, chocos, zucchini, corn, brussel sprouts, cabbage, pumpkin, garlic, chilli and ginger, fruit and vegetable juices, and cut flowers (hereinafter

“peeled fruits, peeled or cut vegetables, cut flowers, nuts and shoots, fruit and vegetable juices”), in a manner which enables the peeled fruits, peeled or cut vegetables, cut flowers, nuts and shoots or fruit and vegetable juices to be suitably packaged and stored for subsequent consumption without unacceptable deterioration.

This object is realised by including in the solution an effective amount of an antioxidant containing flavonoids.

The invention further provides a preservative solution for peeled fruits, peeled or cut vegetables, cut flowers, nuts and shoots, fruit and vegetable juices (as hereinbefore defined) including a fruit juice or water and fruit juice component containing vitamin C which inhibits oxidation of the product to be preserved, a preservative component such as sugar is desired, and an antioxidant component which includes at least one antioxidant containing flavonoids.

The fruit juice component is preferably a fruit juice which is palatable and which inhibits oxidation of the product to be preserved. The antioxidant component can be selected from a natural oil-containing material, such as grapeseed oil and/or any extract from the bark of pinus, such as Pinus Radiata, Pinus Pinasta (Maritime Pine), or from the other flavonoid containing antioxidants described below. Such antioxidants contain substantial amounts of flavonoids and are readily commercially available. Examples of pinus bark extracts include Enzogenol™ (see “Why Enzogenol is an Antioxidant Breakthrough” by Kelvin Duncan dated 1998 in “The Enzogenol Story), or Pycnogenol™, an extract from Maritime Pine (Pinus Pinasta) (see “Pycnogenol The Super Protector Nutrient” Richard A Passwater and Chithan Kandaswami). The grapeseed oil component referred to above can be replaced by a powdered grapeseed extract which is dissolved in the solution.

Other acceptable flavonoid containing antioxidants include Acerola, Rutin, Hesperidin (Vitamin P), Alpha Lipoic Acid, Quercetin, Blueberry Powder, Bioperin, Lactein, Xanthophyll (marigold essence), Lycopene (tomato extract), Methylsulfonylmethan (MSM), Boswellia Serrata, Schizandra Chinensis, Citrin, Flavones, Catechin, Flavonols, Citrus Seed Extract, Rhodiola

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Rosea, Juniper Berry Powder Extract, Astraeus Membranaceus Extract, Echinacea Augusifolia Extract, Gold Seal Extract, Cranberry Extract.

The vitamin C component of the preservative solution can be contained in the fruit juice component or can be supplemented or provided by appropriate ascorbates of calcium, magnesium, sodium or potassium. Suitable fruit juices containing appropriate amounts of vitamin C or ascorbate include cranberry juice (*vaccinium macrocarpon*), lemon juice, rose hip tea or powder (*rosa canina*) or green tea (*camellia sinensis*), pineapple juice, juniper berry tea or juniper berries powder or blackcurrant juice. This list is not meant to be exhaustive and other natural fruit juices or teas having appropriate levels of vitamin C or ascorbate can be used with equally successful results.

The process of the present invention effectively replaces the detrimental results of chopping and peeling by replacing the vitamin C, ascorbates and flavonoids of the peeled or chopped product. In food preparation, there are serious losses in flavonoids, and the replacement of those flavonoids by the preservative solution of the present invention ensures that the product is preserved in an apparently fresh state for a considerable period of time.

Grapes, apples, grapefruit, broccoli, onions and fennel contain the flavonoid Quercetin, and the replacement of this important flavonoid by the use of the preservative solution ensures that the product is preserved in a natural state.

The flavonoid Acerola is found in cherries, and the loss of that flavonoid can be replaced in a peeled or cut version of this fruit by the preservative solution of the invention.

Berries contain the flavonoid Schizandra Chinensis, and such berries will also respond well to the replacement of that particular flavonoid by means of the preservative solution of the present invention.

Due to the fact that flavonoids increase the absorption of vitamin C, many flavonoids are found to be effective across the whole spectrum of fruit (deciduous or tropical) and vegetables. Hesperidin, the bio-flavonoid sometimes called vitamin P includes Quercetin, Citrin, Rutin, Flavones,

Catechin and Flavonols. The versatility of this bio-flavonoid is apparent together with the following bio-flavonoids.

- 1) Tomato (Lycopene), and
- 2) Marigold (xanthophyll), or any one or more of the flavonoid  
5 containing antioxidants defined above.

These particular bio-flavonoids will be referred to below in relation to the preservation of fruits, vegetables and cut flowers.

The interchangeability of vitamin C and ascorbates are tolerated favourably by all products as defined above, and the particular  
10 interchangeability of flavonoids with any fruit or vegetable is particularly apparent. In nature, there are over four thousand types of flavonoids in the form of water soluble compounds, and it is therefore possible to use mixes of flavonoids and vitamin C or ascorbic acids in the preservative solution of the present invention. By suitably selecting the most appropriate flavonoids,  
15 vitamin C or ascorbic acids, the taste of the preserved product is always fresh and the flesh of the product firm.

If desired, zinc can be combined with vitamin C or ascorbate as it enhances its function. For example, zinc gluconate can be added to water with lemon juice to preserve vegetables such as potatoes and fruits such as apples  
20 and pears. Beta Carotene can also be added to vegetables in the presence of vitamin C or ascorbates. Beta Carotene is the water soluble form of vitamin A. Similarly, d- $\alpha$ -tocopherol may be added when vitamin C or ascorbates are present in the preservative solution. This compound is natural vitamin E which is an antioxidant which functions well together with Beta Carotene and zinc to  
25 inhibit degeneration of the fruit, vegetable or fruit juice.

In the specific examples described below, it will be noted that products being preserved are dipped or soaked for a short interval in the preservative solution, and it has been found that the solution is absorbed only into the surface of the product rather than absorbed deeply into the flesh of the product.  
30 Nevertheless, acceptable preservation is still achieved.

Fruit salad having the preservative solution as its juice, achieved

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remarkable longevity, even when apple is included.

In applying the preservative solution to the products defined above, it is preferred to dry some products after the preserving solution is applied. By drying the treated product, it is found that the preserving solution is more  
5 successful.

The preferred fruit juice component is pineapple juice, but other fruit juices or fruit juice combinations, such as lemon juice and water, which are palatable and which inhibit oxidation can be used.

In one preferred form of the invention, a preservative solution for peeled  
10 fruit or vegetables include about 40% to 60% by weight of pineapple juice, about 40% to 60% by weight of sugar, and about 0.04% to 0.06% by volume of grapeseed oil and/or Enzogenol or Pycnogenol e.g. (proanthocyanidin powder).

In preparing the above defined solution, the pineapple juice and sugar components are preferably boiled for a period of about three minutes and  
15 allowed to cool before adding the grapeseed oil and/or Enzogenol, proanthocyanidin, Pycnogenol or any other suitable proanthocyanidin powder to preserve the antioxidant properties of the oil.

The invention further provides a preservative solution including a boiled or substantially sterile water and sugar solution, an anti-browning component  
20 selected from lemon juice, citric acid or ascorbic acid, and an anti-oxidant component including at least one antioxidant containing flavonoids.

Suitably sterile water can be produced by adding about 4 drops of colloidal silver to 1 litre of water. Colloidal silver has a sanitising effect acceptable under the N.H.M.R.C and U.S.E.P.A. water quality guidelines.

25 The antioxidant can be selected from a natural oil coating material, such as grapeseed oil, an extract from the bark of pinus such as Pinus Radiata or an extract from the bark of pinus pinaster, or Pinus Maritime, such as the antioxidant products described above.

The amount of sugar contained in the solution depends on the fruit or  
30 vegetable being preserved and may vary from about 2% by weight to about 40% by weight.

The invention further provides a process for preserving peeled fruits, raw vegetables, nuts, shoots, and fruit or vegetable juices, including the steps of peeling the fruit or preparing the vegetable, nut, shoots or juice, removing the central pith material from the fruit if necessary, soaking the fruit or vegetable in the solution as defined above, or adding the solution to the juice, and suitably packaging the preserved fruit or vegetable, nut, shoots or juice. Citrus fruits are preferable soaked whole, although they can be cut or segmented. Vegetables are at least peeled and can be cut as for usual preparation for cooking or eating.

If desired, the fruit or vegetable can be preserved by the process in cut or segmented pieces.

In packaging the fruit, vegetables, nuts, shoots and juices, it is preferred to package in the presence of a suitable known food gas, such as those containing nitrogen and carbon dioxide gases. Once packaged the produce is refrigerated at a constant of between 0°C and 6°C.

In a particularly preferred form of the invention, the pineapple juice is preferably unsweetened pineapple juice, while the sugar component is preferably processed white sugar.

In the preservation of grapefruit, a quantity of up to about 50% of the pineapple juice may be replaced by grapefruit juice, while the sugar content is preferably provided by raw sugar rather than processed sugar. Otherwise, the preserving solution is the same as for oranges.

If desired, the solution may include an appropriate quantity of rose pink colouring, such as food colour 122.

As mentioned above, the natural oil coating component, such as grapeseed oil, may be replaced or supplemented by extracts from the bark of Pinus Radiata or pinus pinaster. This latter material is described in greater detail in United States Patent No. 4,698,360, the contents of which are incorporated herein by cross-reference. These alternative or supplementary substances are used because they protect the fruit, vegetables, nuts and shoots from oxidative damage. Enzogenol has a wide mixture of flavonoids from every flavonoid group, the natural defence mechanism of many plants, which

protect against fungal parasites, herbivores, pathogens and oxidative cell injury and environmental stress. Flavonoids contribute to the colour, nutritional value, texture and taste of fruit, vegetables, nuts and shoots, and to their keeping qualities.

5 Pycnogenol has built into it an enzyme delivery system, and as a medicinal dose, the suggested daily dose is 20mg for every 20 pounds of body weight. As reported by the International Bio-Research Inc, no toxic doses have been found. There are no recommended levels for flavonoid intake for humans, but one has to eat an enormous quantity of fruit and vegetables to obtain  
10 reasonable levels for flavonoids from these sources. Because not all fruit and vegetables contain the same flavonoids, or similar proportions of various flavonoids. Enzogenol is excellent because of its extremely wide range of flavonoids and phenolic acids. Flavonoids and phenolic acids are removed during handling, storing, skinning and peeling. The above described extracts  
15 are beneficial to the preservative solution according to the invention because they are water soluble and fat soluble.

In order that the invention may be more readily understood, preferred embodiments of the invention will now be described in further detail.

#### Description of Preferred Embodiments

##### 20 Orange Preservation

Oranges can be preserved by this embodiment of the invention by fully peeling the orange and radically cutting the central pith region of the orange as part of the peeling process.

The preserving solution is prepared by boiling about 400 grams of  
25 unsweetened pineapple juice, and about 400 grams of white sugar for about three minutes, and allowing the solution to cool. Following cooling, about 4 teaspoons of grapeseed oil with or without 20 to 60mg of Enzogenol or proanthocyanidin, Pycnogenol or any other suitable proanthocyanidin powder are added to the solution. The peeled oranges are then fully immersed in the  
30 cooled solution for about three minutes, following which the soaked oranges are removed and suitably packaged. The packaging preferably seals the preserved



fruit within the package in the presence of a suitable food grade gas, although acceptable results are achieved without the use of the gas.

#### Grapefruit Preservation

In the preservation of grapefruit, the fruit is peeled and the central pith region radically removed. A preservative solution including 125 grams of white sugar, 125 grams of raw sugar, 125 grams of unsweetened pineapple juice, and 125ml of grapefruit juice, is boiled for about three minutes and then cooled. Following cooling, 25mls of grapeseed oil, with or without 20-60mg of Enzogenol and proanthocyanidin, Pycnogenol or any other suitable proanthocyanidin powder and one drop of rose pink colouring are added to the solution. The peeled fruit is immersed in the cooled solution for about three minutes, following which it is packaged in the same manner as the preserved oranges.

In the case of tropical fruits, grapeseed oil is optional and is preferably replaced by the above extracts.

The above preserving solutions can be used with success with oranges, mandarins, tangerines, kiwi fruits, mango, pineapple, apricots, blackberries, raspberries, mulberries, cherries, blue berries, figs, peaches, nectarines, pears, nashi, plums, tamarillo, cantaloupe, grapefruit, apples, guavas, lychees, rumbutans, melon, passionfruit, and mangostein,. Avocado did not brown, once it had been introduced to the orange formula.

Most fruits and avocado were soaked in the formula for about two to four minutes, drained, then packaged in an airtight container, and refrigerated or packaged in a tamper-proof plastic container (PET™ or PAK™) and refrigerated, or tamper-proofed as above after being filled with food grade gas (50% CO<sub>2</sub> and 50% nitrogen) and then refrigerated. In the case of apple, pears, nashi and guava, 12 to 15 minutes soaking is required.

Fruit and vegetable preserving solution using Enzogenol and/or proanthocyanidin powder. This was created especially for apples in the beginning, but it was found to be highly successful for preserving pears, nashi, kiwi fruit, lychee, peaches, nectarines, pineapple, honey dew melon, seedless

watermelon, star fruit, strawberries, rumbuhtans and baby coconut.

The formula is able to preserve vegetables such as broccoli, cauliflower, green beans, snow peas, celery, carrot, capsicum, chocos, zucchini, mushrooms, garlic and ginger. Vegetables are treated individually as to the time allowed to  
5 soak in the formula: the average time is six minutes.

The formula is also able to preserve chestnuts, shelled and peeled. The soak time is 6-10 minutes. The formula is also able to preserve shoots, such as alfalfa or mixed shoots, or mung bean shoots. The soak time is 2-3 minutes.

#### Apple Formula

- 10 1. 400mls spring water (preferably purified with 4 drops colloidal silver to  
1 litre water)
2. 20gms sugar  
boil for 3 minutes then cool
3. 20mg Enzogenol powder or proanthocyanidin powder
- 15 4. 60mls lemon juice or 20 mg ascorbic acid.

#### Nashi Formula

1. 400mls spring water (preferably purified with 4 drops colloidal silver to  
1 litre water)
2. 100gms sugar  
20 boil for three minutes then cool
3. 20mg Enzogenol powder or proanthocyanidin powder
4. 15mls lemon juice

#### Honey-Dew Melon

1. 400mls spring water
- 25 2. 100gms sugar  
boil for three minutes then cool
3. 10mg Enzogenol powder or proanthocyanidin powder
4. 10mls lemon juice

Various fruit or vegetables, nuts or shoots are applied to either of the  
30 formulas or variations. Granny Smith apples are soaked for 10 minutes, softer apples for 8 minutes, nashi are soaked for 3 minutes, pears for 5, melons for 3

minutes.

All the products are drained and packed as above and refrigerated. Apples, pears and nashis are still white and crisp after 3 weeks. Kiwi fruit responds just as well to the apple formula as the orange formula.

- 5        After introducing the fruit, vegetables, nuts and shoots to the relevant formula, all products are of a rich colour, crisp, firm, natural and fresh tasting and smell fresh. Even "tired" broccoli revived and improved after being preserved in the apple formula.

In the above formula:

- 10       lemon juice, ascorbic acid and citric acid may be used together or interchangeably;

grapeseed extract which is also a flavonoid rich substance may be used alone or together with the pine bark extract;

all nuts, coconut including "baby coconut" can be readily preserved;

- 15       all tropical fruit may also be preserved using the solution.

The bio-flavonoids Lycopene and Xanthophyll can be used together in the proportions, Lycopene 3mg and Xanthophyll 2.1mg per 400ml of preservative solution.

- 20       Rose hip fruit powder (*rosa canena* or *rhodiola rosea*) is also able to be used.

Bio-flavonoids powder can be used 25mg for each 1.5 grams of ascorbate or vitamin C in the preservative solution.

Juniper berry powder can be used in the proportion 5mg per 400ml of preservative solution with 2mg of ascorbate.

- 25       Grapeseed powder extract can be used instead of grapeseed oil and the proportions 40mg per 400ml of preservative solution, provided that solution contains vitamin C or ascorbate.

- 30       Maritime pine bark extract can be used in place of *Pinus Radiata* bark extract. Similarly, *Astragalus membranaceus* extract equivalent to dry inner stem bark 60 to 100mg per 1000ml of preservative solution can be used in place of the *pinus* bark extracts referred to above. Furthermore, *echinacea*

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angustifolia extract equivalent to dry root 100mg standardised to contain echinoside 1.7mg per 1000ml of preservative solution may be used in place of any one of the above.

Alternatively, gold seal (hydrastis canadensis extract) equivalent to dry stem bark 150mg may be used in place of the above.

Similarly cranberry (vaccinium macrocarpon) 100mg dry fruit equivalent to 10 grams fresh fruit juice can be added to 400ml of preservative solution.

Similarly, Quercetin, Acerola, Schizandra Chinensis, Hesperidin and Rutin can also be added to the preservative solution to provide flavonoid input to preserve the fruit, vegetable or other product. In addition to Alpha Lipoic Acid, Blueberry Powder, Bioperin, Lactein, Xanthophyll (marigold essence), Lycopene (tomato extract), Methylsulfonylmethan (MSM), and Boswellia Serrata, Citrin, Flavones, Catechin, Flavonols, Citrus Seed Extract, Rhodiola Rosea, Juniper Berry Powder Extract, Astragalus Membranaceus Extract, Echinacea Angustifolia Extract, Gold Seal Extract, Cranberry Extract.

#### Fruit Juices

Testing was done with navel oranges which are notorious for turning bitter after a short time of cutting or juicing. Juice squeezed at the same time was divided into three. One "control" sample was regular untreated juice, one test had a same measure of Navel orange juice with Enzogenol and one test had the same measure of orange juice with Pycnogenol. At the two week mark the taste test showed definite bitterness in the control juice but only sweetness and freshness in the other two. At the three week mark the taste test of 1 was sharper, but 2 and 3 remained unchanged. The preserved juice contained 200mls navel orange juice to 40mg Enzogenol or 20mg Pycnogenol. Apples were juiced with the same measurements allowing also 2 to 5mg ascorbic acid per 200ml apple juice as well as the Enzogenol or Pycnogenol (proanthocyanidin powder) or grapeseed extract. No change at week four for examples 2 and 3.

#### Cut Flowers

It is expected that in the same way that broccoli and beans revived after

treatment with pine bark extract containing solution, that cut flowers would also, if these or any other flavonoid were placed in water holding cut flowers with a small quantity of ascorbate. For example 5mg of Ascorbate (eg potassium ascorbate), 20mg of Enzogenol to about 2 litres of water.

5        Alternative Vegetable Formulae

1.        200ml boiled water  
          5mg green tea extract  
          cool, then add  
          5mg ascorbic acid
- 10       5mg grapeseed oil and/or equivalent powder or apricot oil
2.       200ml boiled water, cool then add  
          5mg grapeseed extract  
          5mg ascorbic acid  
          5mg grapeseed oil and/or equivalent powder or almond oil
- 15       3.       Effuse 6 juniper berries in 150ml boiled water, then cool  
          Add 5mg calcium ascorbate  
          Add 5mg zinc gluconate  
          Add 500 I.U. d-alpha-tocopherol (emulsified vitamin E)

20       In each of the above examples, it is preferred that the fruit, vegetable, nut, shoot or other product to be preserved is dried after being immersed in the preservative solution. Drying of the preserved product has been found to improve the preservative effect significantly.

25       Testing of the above described preserving solutions and processes have demonstrated that peeled oranges and grapefruit can be kept for considerable periods without unacceptable deterioration of the product. Thus, the applicant has been able to store the preserved fruit under domestic refrigeration for a period of the order of eighteen months. It is expected that similar results will be achieved in the preservation of mandarins and other citrus fruits.

## CLAIMS:

1. A preservative solution for peeled fruits, peeled and cut fruits including fruit salad, peeled or cut vegetables, cut flowers, nuts and shoots, fruit and vegetable juices (as hereinbefore defined) characterised by the inclusion of  
5 an effective quantity of one or more antioxidants containing flavonoids.
2. The solution of claim 1, wherein the antioxidants are selected from extracts of pinus bark, such as Enzogenol or Pycnogenol, suitable proanthocyanidin powders, Acerola, Rutin, Hesperidin (Vitamin P), Alpha Lipoic Acid, Quercetin, Blueberry Powder, Bioperin, Lactein, Xanthophyll  
10 (marigold essence), Lycopene (tomato extract), Methylsulfonylmethane (MSM), Boswellia Serrata, Schizandra Chinesis, Citrin, Flavones, Catechin, Flavonols, Citrus Seed Extract, Rhodiola Rosea, Juniper Berry Powder Extract, Astragalus Membranaceus Extract, Echinacea Angustifolia Extract, Gold Seal Extract and Cranberry Extract.
- 15 3. The preservative solution of claim 1 or 2, including a fruit juice or water and a fruit juice component containing vitamin C which inhibits oxidation of the product to be preserved, a preservative component such as sugar if desired, and an antioxidant component which includes at least one antioxidant containing flavonoids.
- 20 4. A preservative solution for peeled fruit and vegetables, including about 40% to 60% by weight of pineapple juice, if desired about 40% by weight of sugar and about 0.04% to 0.06% by volume of grapeseed oil and/or equivalent powder and/or about 0.003% to 0.008% by weight of Enzogenol, acceptable amounts of Pycnogenol or an equivalent amount of a suitable  
25 proanthocyanidin powder.
5. A preservative solution for peeled citrus fruits such as oranges, mandarins and the like, including 400 grams of white sugar, 400mls of unsweetened pineapple juice, boiled together for about 3 minutes to pasteurise the solution, and about 20mls grapeseed oil and/or equivalent powder and  
30 20mgs of Enzogenol or proanthocyanidin powder which is added to the cooled pasteurised solution.

6. A preservative solution for peeled grapefruit, including 250 grams of raw sugar, 125mls of unsweetened pineapple juice, 125mls of grapefruit juice boiled for three minutes and cooled and 25mls of grapeseed oil and/or equivalent powder and 20mgs of Enzogenol, acceptable amounts of Pycnogenol  
5 or an equivalent amount of a suitable proanthocyanidin powder added to the cooled solution.

7. A preservative solution including a boiled water and if desired sugar solution, an anti-browning component selected from lemon juice, citric acid or ascorbic acid, and an anti-oxidant component selected from a natural oil  
10 coating material, such as grapeseed oil, an extract from the bark of Pinus Radiata or Pinus Pinasta, or any other suitable extract from the bark of pinus, or any one of the other antioxidants containing flavonoids, or as defined in claim 2.

8. A preservative solution according to claim 7 wherein the amount of sugar contained in the preservative solution depends on the fruit or vegetable  
15 being preserved and may vary from about 2% by weight to about 40% by weight.

9. A preservative solution for peeled apples including 400mls of springwater, sterile water or water purified by the addition of colloidal silver, 20 grams of sugar boiled for three minutes and then cooled, 20mgs of Enzogenol  
20 powder or proanthocyanidin powder together with 60mls of lemon juice or 20 milligrams of ascorbic acid mixed with the cooled water/sugar solution.

10. A preservative solution for nashis including 400mls of springwater, sterile water or water purified by the addition of colloidal silver, 50 grams of sugar boiled for three minutes and then cooled, 20mgs of Enzogenol  
25 powder or proanthocyanidin powder and 15mls of lemon juice added to the cooled solution.

11. A preservative solution for peeled honey-dew melon including 400mls of springwater, sterile water or water purified by the addition of colloidal silver, 100mls of sugar boiled for three minutes and then cooled, 10-  
30 20mgs of Enzogenol powder or proanthocyanidin powder and 10mls of lemon juice added to the cooled solution.

12. The preservative solutions of any one of claims 7 to 11, wherein lemon juice is replaced by ascorbic acid or citric acid.

13. The preservative solution of any preceding claim, wherein the solution is used to preserve nuts, coconut flesh, bean shoots and tropical fruit.

5 14. The preservative solution substantially as described in any one of the specific examples described herein.

15. A preserved fruit or vegetable juice including fruit or vegetable juice and an effective amount of antioxidant containing flavonoids.

16. Preserved orange juice containing about 20mg to 60mg Enzogenol  
10 or 10mg to 30mg Pycnogenol per 200mls of juice.

17. Preserved apple juice containing about 2 to 5mg ascorbic acid, about 20mg to 60mg Enzogenol or 10mg to 30mg Pycnogenol per 200mls of juice or about 5mg grapeseed extract.

18. Preserved pineapple juice containing about 20-60mg of Enzogenol  
15 or 10 to 30mg Pycnogenol per 200mls of juice.

19. The preserving solution and preserved products as claimed in any preceding claim, wherein the antioxidant is selected from extracts from pinus bark, such as Enzogenol or Pycnogenol, suitable proanthocyanidin powders, Acerola, Rutin, Hesperidin (Vitamin P), Alpha Lipoic Acid, Quercetin,  
20 Blueberry Powder, Bioperin, Lactein (marigold essence), Lycopene, Methylsulfonylmethan (MSM), and Boswellia Serrata.

20. A preserving solution for cut flowers including water containing an effective amount of antioxidant containing flavonoids.

21. The solution of claim 20, wherein the water is sterilised by the  
25 addition of about four drops of colloidal silver per litre of water.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01041

**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: A23B 7/154, 9/26 A23L 3/3544 A01N 3/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

WPIDS, CA SEE BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
FSTA SEE BELOWElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
CA, FSTA, WPIDS: proanthocyanidin, pine bark extract, grapeseed oil or extract, enzogenol, pycnogenol, antioxidant, flavonoid, rutin, hesperidin**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract AN 2000-056721/05 * JP A 11299452 (HAYASHIBARA SEIBUTSU KAGAKU) 2 November 1999 See entire abstract.	1-3, 7, 8, 12, 15, 19-21
X	Derwent Abstract AN 1999-496384/42. JP B 2938009 (FOODIUM TOKUNAGA YG) 23 August 1999 See entire abstract.	1-3, 7, 8, 12, 15, 19-21

☒ Further documents are listed in the continuation of Box C
 ☒ See patent family annex

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 October 2000

Date of mailing of the international search report

16 OCT 2000

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01041

**C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract AN 99-324045/27 JP A 11117193 (OJI TAKKU HANBAI KK) 27 April 1999 See entire abstract.	1-3, 7, 8, 12, 15, 19-21
X	Derwent Abstract AN 96-459073/46 JP A 08228685 (KIKKOMAN CORP) 10 September 1996 See entire abstract.	1-3, 7, 8, 12, 15, 19-21
X	Derwent Abstract AN 91-300280/41 JP A 3200781 (KIKKOMAN CORP) 2 September 1991 See entire abstract.	1-3, 7, 8, 12, 15, 19-21
X	EP A 420 376 (KABUSHIKI KAISHA HAYASHIBARA SEIBUTSU KAGAKU KENKYUJO) 3 April 1991 See in particular page 3, lines 9-14, pages 7-8, examples B2 and B6, claims 10 and 11.	1-3, 7, 8, 12, 15, 19-21
X	EP A 402 049 (KABUSHIKI KAISHA HAYASHIBARA SEIBUTSU KAGAKU KENKYUJO) 12 December 1990 See in particular page 4 lines 47-50, page 5 lines 47-55, examples B2, B4 and claims 13-16	1-3, 7, 8, 12, 15, 19-21
X	Derwent Abstract AN 86-065473/10 JP A 1016982 (KIKKOMAN CORP) 24 January 1986 See entire abstract.	1-3, 7, 8, 12, 15, 19-21

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/AU00/01041**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
EP	402 049	CA	2018085	JP	3007593	US	5627157
							END OF ANNEX

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/01248

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